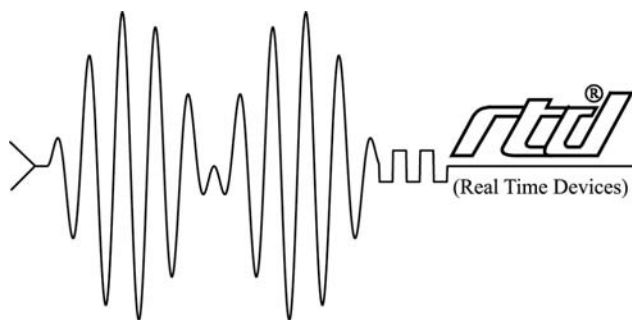


CMT6104

IDE Controller and Hard Drive Carrier utilityModule

User's Manual



RTD Embedded Technologies, Inc.

"Accessing the Analog World"®

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Rev. A

ISO9001 and AS9100 Certified

CMT6104
IDE Controller and Hard Drive Carrier
utilityModule
User's Manual



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Chapter 1 INTRODUCTION

This manual gives information on the CMT6104 IDE Controller and Hard Disk Carrier utilityModule. This module converts PCMCIA/ATA hard drives and Flash Drives that can operate in IDE mode to a standard IDE interface.

CMT6104 IDE and Hard Drive Carrier utilityModule

The CMT6104 utilityModule was designed to provide an IDE hard drive or Flash drive in the PC/104 stack to support the Real Time Devices family of cpuModules and other standard PC/104 processor modules.

Features

The following are major features of the CMT6104 utilityModule.

Allows up to four drives in the PC/104 stack. Supports PCMCIA/ATA drives such as the Integral Viper series and Flash drives such as SanDisk

Jumper selection of bus or cabled operation

- Bus mode -- decodes IDE interface through the PC/104 bus for cableless operation
- IDE mode -- attaches drive to a cpuModules IDE interface and to attach a slave to a master drive

Jumper selection of primary or secondary IDE interface in bus mode

- Primary -- IDE Interface at 1F0-1F7h
- Secondary -- IDE Interface at 170-177h

Jumper selection of master or slave drive

- Master -- for the first drive on each interface
- Slave -- for the second drive on each interface

Connectors

Connectors provided are:

- CN1: PC/104 Bus (XT)
- CN2: PC/104 Bus (AT)
- CN3: IDE hard drive
- CN4: PCMCIA/ATA connector

Recommended Cables

- 40-pin IDE cable which can be used to connect a master CMT6104 to a slave CMT6104.

General Specifications

- Dimensions: 3.8 x 3.9 x 0.6" (97 x 100 x 16 mm)
- Weight (mass): 3.0 ounces (85 grams)
- 4-layer PCB
- Operating conditions: (not including drive)
 - temperature: -40 - +85 degrees C
 - relative humidity: 0 - 95%, non-condensing
 - Storage temperature: -55 to +85 degrees C

Chapter 2 CONFIGURING THE UTILITYMODULE

The following sections contain information on configuring the utilityModule.

Please read this entire section before attempting to use the utilityModule!

Jumpers

Jumper JP1 configures the following functions:

- Master/Slave
- Bus/Cabled
- Primary/Secondary

Default Settings

The utilityModule is delivered from the factory configured according to the following table.

| Setting | Function |
|-----------------------|--------------|
| A with Integral Drive | Master Drive |
| B with Integral Drive | Slave Drive |
| A with SanDisk Drive | Slave Drive |
| B with SanDisk Drive | Master Drive |

| | |
|-----|-------------------------------|
| BUS | Decode IDE Through PC/104 bus |
| IDE | Use CN3 for IDE interface |

If BUS mode is selected then:

| | |
|-----|-------------------------|
| PRI | Primary IDE interface |
| SEC | Secondary IDE interface |

-
- Notes:**
1. You must select only one of A or B.
 2. You must select only one of BUS or IDE.
 3. If you have selected BUS, you must select only one of PRI or SEC.
-

Jumper Locations

The figure below shows jumper locations.

**Jumper
JP1**



Chapter 3 INSTALLING THE UTILITYMODULE

Since the utilityModule uses a PC/104 stackthrough bus, the only hardware installation you will do is placing the module to the PC/104 stack. To do this, you will connect the PC/104 bus connector with the matching connector of another module.

Recommended Procedure

We recommend you follow the procedure below to ensure that stacking of the modules does not damage connectors or electronics.

- Turn off power to the PC/104 system or stack.
- Select and install standoffs to properly position the utilityModule on the PC/104 stack.
- Touch a grounded metal part of the stack to discharge any buildup of static electricity.
- Remove the utilityModule from its anti-static bag.
- Check that keying pins in the PC/104 bus connector are properly positioned.
- Check the stacking order: make sure an XT bus card will not be placed between two AT bus cards, or it will interrupt the AT bus signals.
- Hold the utilityModule by its edges and orient it so the bus connector pins line up with the matching connector on the stack.
- Gently and evenly press the utilityModule onto the PC/104 stack.

CAUTION: Do not force the module onto the stack! Wiggling the module or applying too much force may damage it. If the module does not readily press into place, remove it, check for bent pins or out-of-place keying pins, and try again.

Chapter 4 CONNECTING THE UTILITYMODULE

The following sections describe connectors of the utilityModule.

Finding Pin 1 of Connectors

A white area silk-screened on the PC board indicates the pin 1 end of connectors. A square solder pad visible on the bottom of the PC board also indicates it.

Please make certain you have correctly identified pin 1 of a connector before you connect to it and attempt to use the utilityModule.

Connector Locations

The figure below shows connector locations.



Connector Locations

| Connectors | | |
|------------|----------------------------|--------|
| Connector | Function | Size |
| CN1 | PC/104 XT Bus | 64 pin |
| CN2 | PC/104 AT Bus | 40 pin |
| CN3 | IDE Connector | 40 pin |
| CN4 | PCMCIA/ATA Connector | 68 pin |
| JP2 | IDE Activity LED Connector | 2 pin |

PC/104 Bus Connectors, CN1 and CN2

Connectors CN1 and CN2 provide PC/104 bus connections. CN1 carries XT bus signals, and CN2 carries additional signals for the AT bus. The signals on CN1 and CN2 conform to the IEEE P966 standard for the PC/104 bus.

The following tables list the connector pinouts:

| PC/104 XT Bus Connector, CN1 | | |
|------------------------------|----------|--------------|
| Pin | Row A | Row B |
| 1 | IOCHCHK* | 0V |
| 2 | SD7 | RESETDRV |
| 3 | SD6 | +5V |
| 4 | SD5 | IRQ9 |
| 5 | SD4 | -5V |
| 6 | SD3 | DRQ2 |
| 7 | SD2 | -12V |
| 8 | SD1 | ENDXFR* |
| 9 | SD0 | +12V |
| 10 | IOCHRDY | (KEYING PIN) |
| 11 | AEN | SMEMW* |
| 12 | SA19 | SMEMR* |
| 13 | SA18 | IOW* |
| 14 | SA17 | IOR* |
| 15 | SA16 | DACK3 |
| 16 | SA15 | DRQ3 |
| 17 | SA14 | DACK1* |
| 18 | SA13 | DRQ1 |
| 19 | SA12 | REFRESH |
| 20 | SA11 | SYSCLK |
| 21 | SA10 | IRQ7 |
| 22 | SA9 | IRQ6 |
| 23 | SA8 | IRQ5 |
| 24 | SA7 | IRQ4 |
| 25 | SA6 | IRQ3 |
| 26 | SA5 | DACK2* |
| 27 | SA4 | TC |
| 28 | SA3 | BALE |
| 29 | SA2 | +5V |
| 30 | SA1 | OSC |
| 31 | SA0 | 0V |
| 32 | 0V | 0V |

| PC/104 AT Bus Connector, CN2 | | |
|------------------------------|--------------|----------|
| Pin | Row C | Row D |
| 0 | 0V | 0V |
| 1 | SBHE* | MEMCS16* |
| 2 | LA23 | IOCS16* |
| 3 | LA22 | IRQ10 |
| 4 | LA21 | IRQ11 |
| 5 | LA20 | IRQ12 |
| 6 | LA19 | IRQ15 |
| 7 | LA18 | IRQ14 |
| 8 | LA17 | DACK0* |
| 9 | MEMR* | DRQ0 |
| 10 | MEMW* | DACK5* |
| 11 | SD8 | DRQ5 |
| 12 | SD9 | DACK6* |
| 13 | SD10 | DRQ6 |
| 14 | SD11 | DACK7* |
| 15 | SD12 | DRQ7 |
| 16 | SD13 | +5V |
| 17 | SD14 | MASTER* |
| 18 | SD15 | 0V |
| 19 | (KEYING PIN) | 0V |

Note: Two locations on the bus have mechanical keying pins to help prevent misconnection of the PC/104 bus. These keying pins are a part of the PC/104 standard, and we strongly recommend you leave them in place.

If you have other modules without keying pins, we suggest you modify them to include keying.

IDE Connector, CN3

CN3 is a 40-pin 0.1" DIL connector is the IDE input connector in IDE mode and the IDE output in BUS mode. The pinout of this connector is shown below.

| IDE Hard Drive Connector, CN3 | | | |
|-------------------------------|--------|---------------|--------|
| Pin | Signal | Function | in/out |
| 1 | RESET* | Reset HD | out |
| 2 | GND | Ground signal | -- |
| 3 | HD7 | HD data 7 | in/out |
| 4 | HD8 | HD data 8 | in/out |
| 5 | HD6 | HD data 6 | in/out |
| 6 | HD9 | HD data 9 | in/out |
| 7 | HD5 | HD data 5 | in/out |
| 8 | HD10 | HD data 10 | in/out |
| 9 | HD4 | HD data 4 | in/out |
| 10 | HD11 | HD data 11 | in/out |

| | | | |
|----|---------|--------------------------|--------|
| 11 | HD3 | HD data 3 | in/out |
| 12 | HD12 | HD data 12 | in/out |
| 13 | HD2 | HD data 2 | in/out |
| 14 | HD13 | HD data 13 | in/out |
| 15 | HD1 | HD data 1 | in/out |
| 16 | HD14 | HD data 14 | in/out |
| 17 | HD0 | HD data 0 | in/out |
| 18 | HD15 | HD data 15 | in/out |
| 19 | GND | Ground signal | -- |
| 20 | n.c. | | -- |
| 21 | AEN | Address Enable | out |
| 22 | GND | Ground signal | -- |
| 23 | IOW* | I/O Write | out |
| 24 | GND | Ground signal | -- |
| 25 | IOR* | I/O Read | out |
| 26 | GND | Ground signal | -- |
| 27 | IOCHRDY | I/O Channel Ready | in |
| 28 | BALE | Bus Address Latch Enable | out |
| 29 | n.c. | | |
| 30 | GND | Ground signal | -- |
| 31 | IRQ | Interrupt Request | in |
| 32 | IOCS16* | 16 bit transfer | in |
| 33 | A1 | Address 1 | out |
| 34 | GND | Ground signal | -- |
| 35 | A0 | Address 0 | out |
| 36 | A2 | Address 2 | out |
| 37 | HCS0* | HD Select 0 | out |
| 38 | HCS1* | HD Select 1 | out |
| 39 | LED | HDD activity LED (-) | in |
| 40 | GND | Ground signal | -- |

PCMCIA/ATA, CN4

The 68 pin PCMCIA/ATA connector is to connect hard drives and Flash ATA cards. This is not a full PCMCIA interface and only works with ATA drives like the Integral Viper series and the SanDisk Flash Drives with "True IDE" mode.

Chapter 5 **USING THE UTILITYMODULE**

IDE Hard Disk

In general, IBM-PC computers support two IDE interfaces. Each interface can support a master and a slave IDE drive which allows up to 4 drives in a computer (assuming that the CPU BIOS supports 4 drives).

The CMT6104 operates as a drive carrier to convert the PCMCIA connector to the standard 40 pin IDE connector and provide a master/slave jumper. It can also be an IDE controller for computers without an IDE interface or to add a secondary IDE interface to a computer that only has one. These two modes of operation are selected by installing one of the IDE or BUS jumpers.

The hard drive controller of the utilityModule appears as a standard PC IDE hard drive controller. It will support standard IDE drives (less than 528MB) and enhanced IDE drives (over 528MB).

You may need to run the setup program for your cpuModule or computer to configure the correct hard drive type.

IDE Mode

This mode duplicates the operation of previous versions of the CMT6104. The PC/104 bus only provides power to the drive. The board performs a physical interface between the 68 pin PCMCIA connector and the 40 pin IDE connector. The A or B jumpers select master or slave mode for the drive.

BUS Mode

This mode decodes the PC/104 bus to create an IDE interface. This interface can be the primary or secondary interface and the drive can be a master or slave as per the jumpers. The 40 pin IDE connector is used to connect a second drive to this interface. The second drive can be a standard 3.5" drive or another CMT6104 operating in IDE mode.

Power Protection Circuitry

To reduce the risk of damage due to power-supply problems, the utilityModule includes several protective components.

Module Power-Supply Protection

The utilityModule includes components to help prevent damage due to problems with the +5Vdc power supply from the PC/104 bus or power-supply connector. Protection is provided for:

- Over-current
- Reversed polarity
- Excessive voltage

This protection is only for the utilityModule, and will not protect other devices in a PC/104 stack or any of the Flat Panel power supplies.

The protective fuse is replaceable and is available from electronics suppliers. Its description and part number are:

Littelfuse Nano² SMF 1.0 amp, R451-001

Caution: Replace fuses only with parts of identical current and voltage rating.

Chapter 6 INTERFACING IDE DRIVES

The utilityModule can be configured in several methods.

Connecting the CMT6104 to a computer with an IDE controller as the only IDE drive

- Install IDE jumper
- Remove BUS jumper
- Install PRI jumper (Not used since in IDE mode)
- Remove SEC jumper (Not used since in IDE mode)
- Connect a 40 pin cable from CPU's IDE connector to the CMT6104 IDE connector CN3, be careful to observe pin 1 orientation
- Install jumper A select master for Integral drives or install jumper B to select master for SanDisk drives
- Use the CPU's setup utility to configure the heads, cylinders and sectors for the drive

Connecting the CMT6104 to a computer without an IDE controller as the only IDE drive

- Install BUS jumper
- Remove IDE jumper
- Install PRI jumper
- Remove SEC jumper
- Install jumper A select master for Integral drives or install jumper B to select master for SanDisk drives
- Use the CPU's setup utility to configure the heads, cylinders and sectors for the drive

Connecting the CMT6104 to a computer as the secondary IDE drive controller

- Install BUS jumper
- Remove IDE jumper
- Install SEC jumper
- Remove PRI jumper
- Install jumper A select master for Integral drives and install jumper B to select master for SanDisk drives
- Use the CPU's setup utility to configure the heads, cylinders and sectors for the drive

Using a CMT6104 as a slave drive

- Install IDE jumper
- Remove BUS jumper
- Install PRI jumper (Not used since in IDE mode)
- Remove SEC jumper (Not used since in IDE mode)
- Connect a three connector 40 pin cable from CPU's IDE connector to the master drive and to the CMT6104 IDE connector CN3, be careful to observe pin 1 orientation
- Install jumper B select slave for Integral drives or install jumper A to select slave for SanDisk drives
- Use the CPU's setup utility to configure the heads, cylinders and sectors for the drive

Chapter 7 RETURN POLICY AND WARRENTY

Return Policy

If you wish to return a product to the factory for service, please follow this procedure:

Read the Limited Warranty to familiarize yourself with our warranty policy.

Contact the factory for a Return Merchandise Authorization (RMA) number.

Please have the following available:

- Complete board name
- Board serial number
- A detailed description of the board's behavior

List the name of a contact person, familiar with technical details of the problem or situation, **along with their phone and fax numbers, address, and e-mail address** (if available).

List your shipping address!!

Indicate the shipping method you would like used to return the product to you.

We will not ship by next-day service without your pre-approval.

Carefully package the product, using proper anti-static packaging.

Write the RMA number in large (1") letters on the outside of the package.

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